

IN THE SPECIFICATION:

Paragraph beginning at line 3 of page 1 has been amended as follows:

The present invention relates to a vacuum apparatus and a transfer apparatus used for use with a semiconductor manufacturing apparatus, a manufacturing apparatus for a flat panel display, etc. or the like.

Paragraph beginning at line 20 of page 1 has been amended as follows:

In Fig. 9, a load chamber 701 and an unload chamber 702 each are each arranged in contact with wall surfaces of a transfer chamber 703, which is located in the center of the apparatus. The transfer chamber 703 is, as shown in the figure, formed into a flat surface of a polygon shape, and is provided with a vacuum robot 704 in its center. Process chambers 705, 706 are arranged on the other wall surfaces. The process chambers 705, 706 are chambers for performing processing for the work-piece, processing such as by a CVD process.

Paragraph beginning at line 6 of page 2 has been amended as follows:

There are provided gate valves 707, 7-8, 709, 710 each having an airtight property in the walls which divide the load chamber 701, the unload chamber 702, and the process chambers 705, 706 from the transfer chamber 703. When the vacuum robot 704 transfers the work-piece, the gate valve 707, 708, 709, or 710 is opened. When the vacuum robot 704 finishes the transfer of the work-piece, the gate valve is closed to ~~keep airtightness of each~~ maintain an airtight environment. ~~Also, there are~~ There is also provided doors 711, 712 each having an airtight property between the load chamber 701 and the unload chamber 702, respectively, and the outside. When a not-shown external robot or the like transfers the work-piece, the door 711 or 712 is opened. When the external robot finishes the transfer of the work-piece, the door is closed, exhaust is performed and pressure is reduced to a vacuum, thereby keeping airtightness with the atmosphere.

Paragraph beginning at line 4 of page 4 has been amended as follows:

The vacuum apparatus shown in Fig. 9 is suitable for mass production as described above. However, the operation of

~~transfer~~ transferring the work-piece to and from the process chamber is complicated, and the apparatus ~~becomes~~ is of large-scale, the cost of which is higher and requires wide a large space.

Paragraph beginning at line 23 of page 5 has been amended as follows:

The vacuum apparatus shown in Fig. 10 for performing loading and unloading in one chamber is simpler, is obtained at lower cost and is more space-saving as compared with the vacuum apparatus shown in Fig. 9. However, ~~there are~~ this vacuum apparatus has the transfer chamber and the load/unload chamber, and ~~besides~~ the vacuum robot in the transfer chamber requires a turning mechanism. Therefore, wide a large space is still required.

Heading at line 1 of page 10 has been amended as follows:

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT
EMBODIMENTS

Paragraph beginning at line 2 of page 10 has been amended as follows:

Hereinafter, embodiments according to the present invention will be described with reference to ~~Fig. 1 to Fig.~~
~~8. Figs. 1-8.~~

Paragraph beginning at line 5 of page 10 has been amended as follows:

Fig. 1 is a diagram for explaining a construction of a vacuum apparatus in accordance with the First embodiment of the present invention. Reference numeral 1 indicates a process chamber ~~for performing~~ for processing a work-piece (a wafer in this embodiment) W ~~processing~~ such as by CVD. Reference numeral 2 indicates a transfer chamber connected to the process chamber 1 via a gate valve 3. A transfer apparatus 4 is set in this transfer chamber 2. Also, a blocking door 5 for loading/unloading the work-piece is provided between the transfer chamber 2 and the outside.

Paragraph beginning at line 14 of page 10 has been amended as follows:

The transfer apparatus 4 is an apparatus for ~~transfer to~~ transferring the ~~process chamber 1~~ the work-piece W to the process chamber 1 from the outside via the transfer chamber 2 and transferring the work-piece W back to the transfer chamber 2 after processing of loaded from the outside and transfer back to the transfer chamber 2 the work-piece is completed. having finished the processing. The transfer apparatus 4 is constructed such that: when the gate valve 3 is opened, its tape is pulled out successively and made to be in

an extended state to thereby perform transfer to and transfer from of the work-piece; and when the gate valve 3 is closed, the tape is made to be in a shrunk state to thereby be accommodated inside the transfer chamber 2.

Paragraph beginning at line 23 of page 10 has been amended as follows:

The blocking door 5 opens when the work-piece W is loaded from the outside and the work-piece W is unloaded to the outside. In other ~~time~~, instances, the blocking door 5 ~~else~~ is closed to block the transfer chamber 2 from the air.

Paragraph beginning at line 18 of page 13 has been amended as follows:

As shown in Fig. 7, a shaft 13a of the driving pulley 13 is protruded to the outside of the transfer chamber 2, which is the lower side of the transfer apparatus 4, and is subject to normal and reverse rotation drive by a not-shown motor. ~~Note that, reference~~ Reference numeral 17 indicates a bearing which is projectingly provided from a bottom surface 18 of the transfer apparatus to the inside, and this bearing 17 holds the shaft 13a of the driving pulley in a rotatable manner. Further, a seal 19 ~~for~~ in the form of an O-ring O-ring is provided in the shaft 13a inside the bottom surface

18, and the seal 19 keeps airtightness in the transfer chamber 2. Note that a magnetic fluid seal may be used instead of this O-ring an O-ring. Further, a vacuum motor or an ultrasonic motor, which can be used in a vacuum, is used ~~for~~ as a driving source of the pulley 13 and this is set inside the transfer chamber 2, thereby making it possible to eliminate the seal.

Paragraph beginning at line 21 of page 14 has been amended as follows:

The pressing/direction-converting pulley 15 is mainly supported by a support shaft 20 and thus can freely rotate. The support shaft 20 is fixed to a support shaft seat 21. A pin 22 is protruded from the side of this support shaft seat 21, this pin 22 thrusts a guide hole 23a of a pressing means base 23, and a spring 24 elastically provided between the pressing means base 23 and the pin 22 pushes the pin 22 to the driving pulley 13 side, such that the pressing/direction-converting pulley 15 presses and sandwiches the ~~transfer pulley~~ tape 10 between the driving pulley 13. Note that, reference symbol 22a indicates an E ring which is fit into an outer peripheral groove of the pin 22, and the spring 24 is, more specifically, elastically provided between this E ring and the pin 22.

Paragraph beginning at line 17 of page 15 has been amended as follows:

Next, an explanation is made of an provided for the operation of the first embodiment of the vacuum apparatus.

Paragraph beginning at line 13 of page 17 has been amended as follows:

Fig. 8 is a cross-sectional side view ~~for~~ showing a second embodiment of the present invention. ~~It is the same as in As for the~~ First embodiment, ~~that~~ the holder hand transfer bodies are constructed in two stages of an upper stage and a lower stage in the second embodiment.

Paragraph beginning at line 17 of page 17 has been amended as follows:

~~Second~~ The second embodiment differs from the first embodiment in the following points: the holder hand transfer body 6 (or 7) has a linear guide portion 26 of two stages, and this linear guide portion 26 attaches the work-piece holder hand 11 to its tip end and supports the object, to thereby make the work-piece holder hand 11 move feed and astern while the tape 10 extends and shrinks the linear guide portion 26 of two stages; a width direction of the tape 10 is made to match a horizontal direction, and a direction changing means 25 rotates the rear end side of the tape 10 by 90° downward to

thereby perpendicularly lead the tape 10 to an empty space under a support base of the vacuum apparatus; and a magnet which moves linearly is used as a driving means.

Paragraph beginning at line 5 of page 18 has been amended as follows:

The direction changing means 25 is composed of pulleys 25a, 25b, 25c and 25d disposed in the same arrangement as the feeding means 12 in First the first embodiment. However, these pulley 25a - 25d are provided not for driving the tape 10 but for securely changing the direction of the tape 10 by 90°. The tape 10 is set so as to be slightly sandwiched between these pulleys.

Paragraph beginning at line 18 of page 21 has been amended as follows:

In the second embodiment, as an accommodating place of a tape in a shrunk state, the tape accommodating cylinder is formed by projecting the transfer apparatus to an empty space, whereby the transfer apparatus does not overhang in a lateral direction in the shrunk state. Further, the linear guide portion can also be shrunk compact. Therefore, as in First the first embodiment, the transfer chamber can be made compactly, the size of which is not much different from that of the work-piece.

Paragraph beginning at line 2 of page 22 has been amended as follows:

The driving means by means of the magnets used in ~~second~~ the second embodiment is not directly driven by a motor in the outside of the vacuum apparatus as that in ~~First~~ the first embodiment, and thus there is no need ~~of~~ for a seal for keeping airtightness, airtightness to thereby further enhance reliability of the vacuum chamber. ~~Note that, it~~ It is also possible to use the driving means by means of the same pulley as that in ~~First~~ the first embodiment by using the tape accommodating cylinder accommodation type of the second ~~Second~~ embodiment, and thereby eliminating driving means by means of

magnets and direction changing means, or to use the driving means by means of a pulley as an auxiliary drive of the drive by means of magnets.

Paragraph beginning at line 13 of page 22 has been amended as follows:

A vacuum apparatus according to the present invention is provided with a work-piece holder hand in a tip end portion of a tape in a transfer apparatus, and a tape is extended in its longitudinal direction to extend the work-piece holder hand to the inside of a process chamber to transfer the same, and when finishing the transfer, the tape is returned to the inside of a transfer chamber, and the returned tape is wound around a reel or pulled inside a tape accommodating cylinder extendedly provided under the floor of the transfer chamber. Therefore, the returned tape does not overhand in left and right directions, whereby by the transfer chamber can be made extremely compact, which is not much larger than the work-piece. Since the volume of the transfer chamber can be small and it becomes easy to make place the chamber be in a vacuum, the transfer chamber can serve as the conventional load/unload chamber or both as a load chamber and an unload chamber.

Paragraph beginning at line 4 of page 23 has been amended as follows:

Accordingly, the number of chambers is small and the whole vacuum apparatus becomes compact, whereby it becomes possible to manufacture the apparatus at low cost with a small setting area. This kind of vacuum apparatus is set inside an expensive clean room, and if the setting area of the vacuum apparatus is small, it becomes possible to use a small-scale clean room, which is inexpensive. Thus, an extremely high economic effect can be attained.

Paragraph beginning at line 11 of page 23 has been amended as follows:

A transfer apparatus according to the present invention is provided with a work-piece holder hand in a tip end portion of a tape, the tape slides in its longitudinal direction to overhand and the work-piece holder hand can be transferred for a great distance. Besides, when returning the tape, the returned tape is wound around a reel or pulled inside a tape accommodating cylinder extendedly provided under the apparatus or the like, whereby the returned tape does not overhang in left and right directions as the conventional turning arm type or the frog-leg type. Thus, it is suitable to disposed the apparatus in an arrow room or a place around which is crowded.